

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant :	Roderick J. Scott	Art Unit :	1638
Serial No. :	10/058,825	Examiner :	Stuart F. Baum
Filed :	January 30, 2002	Conf. No. :	2437
Title :	METHODS FOR MODIFYING PLANT ENDOSPERM		

**Mail Stop Appeal Brief - Patents**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**REPLY BRIEF**

Pursuant to 37 C.F.R. § 41.41, Applicant maintains the appeal and responds to the Examiner's Answer mailed on September 11, 2007.

**Rejections Under 35 U.S.C. § 112, 2d Paragraph For Indefiniteness**

1) Transcription Products are RNA

The Examiner stated that the claims are indefinite because it is unclear how a transcription product can be a DNA, when it is known that transcription products are RNA.

Answer at page 3 last paragraph.

The Examiner has seized upon a single sentence from Applicant's Response filed November 7, 2005, to support the indefiniteness rejection. The Examiner quoted from that sentence as follows: "Therefore, the designation *Arabidopsis* Met1 sequence will always refer to the sequence of Accession No. L10692 . . ." See, e.g., Answer at page 3 last paragraph and at page 4, top paragraph. Accession No. L10692 contains a DNA sequence encoding *Arabidopsis* Met1.

The complete sentence from the Response reads as follows: "Therefore, the designation *Arabidopsis* Met1 sequence will always refer to the sequence of Accession No. L10692, despite any future hypothetical changes in abbreviation." (Emphasis added). The statement was made in the context of a discussion of the use of abbreviations and to emphasize that the *Arabidopsis*

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Met1 sequence was known. The statement was not made to argue that transcription products are DNA because Applicant agrees with the Examiner that a transcription product is RNA.

The pending claims recite transcription products in a manner that one of ordinary skill would understand, i.e., that the transcription product of an *Arabidopsis* Met1 sequence (or the *Z. mays* ortholog) is an RNA sequence that is a faithful copy of the DNA template from which the transcription product was transcribed.

For these reasons and the reasons stated in the Appeal Brief, the Board is requested to reverse the rejections for indefiniteness.

### **Rejections Under 35 U.S.C. § 112, 1st paragraph For Lack Of Written Description**

#### **1) Working Example of a Partial Arabidopsis Met1 Sequence**

The Examiner states that the specification does not disclose any partial *Arabidopsis* Met1 or *Z. mays* orthologous sequences. In other words, the Examiner appears to question the truthfulness of Examples 3 and 4 of the specification. Answer at page 5, fourth full paragraph, paragraph bridging pages 13-14 and at page 17, top paragraph.

Applicant's specification provides a working example of a partial *Arabidopsis* Met1 sequence. The sequences of the primers used to clone the *Arabidopsis* Met1 sequence are shown in the specification at page 30, lines 25-27. Alignment of these primers to the full-length *Arabidopsis* Met1 sequence shows that nucleotides 1 to 57 are missing from the 5' end of Applicant's clone relative to the full-length sequence. Nucleotides 4679 to 4730 are missing from the 3' end of Applicant's clone relative to the full-length sequence. A diagram of the full-length *Arabidopsis* Met 1 sequence is presented below, with the locations of the primers underlined and in bold.

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1  tgacgtagcg  accaattagg  gtttcgcaat  cttccagtag  atttcgcttc  gcaacggatt
61  ttgaaatgg  tggaaatgg  ggctaaagct  gcgaagcgaa  agaagagacc  acttccagag
121 attcaagagg  tagaatgtgt  acctaggacg  aggagaccaa  ggcgtgctgc  agcgtgtacc
181 agtttcaagg  agaattctat  tcgagctctg  gagaaatctg  ctactattga  agtaaaagaa
241 cagcagattg  tggaggaaga  gtttctcgcg  ttacggttaa  cggctctgga  aactgatgtt
301 gaagatcgtc  caaccaggag  actgaatgat  ttgttttgtt  ttgattcaga  tggagttcca
361 caacctctgg  agatgtttga  gattcatgac  atattcgttt  caggtgctat  cttaccttca
421 gatgtgtgta  ctgataagga  gaaagagaag  ggtgtgaggt  gtacatcgtt  tggacggggt
481 gacattgga  gtatctctgg  ttatgaagat  ggttcccctg  ttatttggat  ctcaacggaa
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541 ttggcgggatt atgattgtcg taaacctgct gctagctaca ggaaggttta tgattacttc  
601 tatgagaag ctctgtcttc agtggctgtg tataagaaat tgtccaaatc atctgggtggg  
661 gatcctgata taggtcttga ggagttactt gcggcggttg tccagatcaat gagcagtgga  
721 agcaagtactt tttctagttg tgcggcaatc atcgattttg tttatcccca gggagatgtt  
781 atatatcaac aactcgtctg tttggatgag acagccaaga aacatgaatc aagctatgat  
841 gagattctctg ttctctgtgc tctcagagag aagagttagta agattgacaa gccctctgcag  
901 agggaaatga accatctaa tgggtgtgag attaaagaag ttctcaagt tgcggagagc  
961 gagggcttga catctgatca actggttgat ggtactgtat atcacagaag atatgctata  
1021 ctcttacaag caaagagaa taggaaatct atgcaacagc ccagaaaaaa cagcagctca  
1081 ggttctgctt cagaattgtt ctacattaag ataaatgaag atgagattat caagattat  
1141 cctctcccat cgtactataa gacctccgaa gaagaaacag atgaacttat actttatgat  
1201 gctctctatg agttccaatc tgaacacctg cctcacagga tgcctacaa cctggctctt  
1261 tataactctg atttacgatt catatcactg gaacttctac cगतगाााा atgtgatgat  
1321 attgatgtca acatttttgg gtcagggtgtg gtgactgtat ataatggaag ttggatttct  
1381 tttaaacgato ctgacagcgg ttctcagtca cagcatcctg atgggatgtg catattctct  
1441 agtcaaatca aaactatggt gatttgagtt gggagcgatg atattatctc cattctctga  
1501 cgaacagatg tggcctggta cgtcttggg aaacatcaa aactttatgc cctctgggtg  
1561 aaacctgttc tgaaaacagc aagggttggg ataagcattc ttactttct taggggtgaa  
1621 agtaggggtg cttagctttc atttgcagat gtcacaaaaa gactgtctgg gttcacaggc  
1681 aatgataaag cttaacattc ttctgacccc ttggctgttg agagatattt ggtcgtccat  
1741 gggcaaatat ttttccagct ttttgcagtt tatccggagc acaatgtcaa aagggtgtca  
1801 tttgtgtgtg gtcttgcaag caaattggag gataggcacc acacaaaaat gatcatcagg  
1861 aagaagaaaa tttcgtgtaa ggaactgaat ctgaatccaa gggcaggcat gccaccagta  
1921 gcacogaaga gaaaagctat gcaagcaaca acaactgcc tggctcaacag aattttggga  
1981 gagttttact ccaattactc tccagaggat ccattgcagt cgactgtcg agaaaaatggg  
2041 gaggtgagtg tggaaagga aggcggaaat ggggaggaag aggttgaaga ggaaggtgaa  
2101 aatgggtctca cagaggacac tgtaccagaa cctgttgagg ttcagaagcc tcatactct  
2161 aagaanaatcc gaggcagttg tggaaaaaagg gaaataaaat gggatggtga gagtctagga  
2221 aaaaacttctg ctggcagccc tctctatcaa caagcccttg ttggagggga aatgtgtgct  
2281 gtagggtggc ctgtcacctt ggaagttgat gatccagatg aaatgccggc catctatttt  
2341 gtggagtaca tgttcgaaag tacagatcac tgcanaatgt tacatggtag attcttcaaa  
2401 agaggatctca tgaactgtct ggggaatgct gctaacgaga gggaaactatt cctgataat  
2461 gaatgcgatga ctacacagct caaggacatt aaaggagtag ccagttttga gatctgatca  
2521 aggcctatggg ggcattcagta taggaaaaag cactcactg ccgatacgtg tgaactggct  
2581 agagcattga aaagaaaaatg aaaagatttg ccaacagagt attactgcaa aagcttgtac  
2641 tcacctgaga gagggggatt ctttagtctt ccactaagtg atattggtcg caagtctggg  
2701 ttctgcactc catgtaagat aaggggagat gaagagaaga ggtctacaat taactgtaat  
2761 gtttcaaaag cagggctttt catcaatggg attgagtatt ctgttgagga ttttgtctat  
2821 ctcaaccctg actctattgg tgggttgaa ggggttagta aaactcttt taagtctggg  
2881 cgaaacattg ggttaagagc gtatgttgtt tgccaattgc tggaaattgt tccaaaggaa  
2941 tctgaaaagg ctgatttggg ttccattgat gttaaagtga gaaggtttta taggcoagag  
3001 gatgtttctg cagagaaggc ctatgcttca gacatccag aatttgtatt tggccaggag  
3061 acagttgttc tccctccagg tgctctagag ggaanaatgt aagtaagaaa gaaaagtgat  
3121 atgcccattc ccgctgaata tccaatatca gaccatttt tctctctctg tcttctctt  
3181 gacacctcaa aaggttctct caagcagctg cccgccaaat tgaagccaaa gttctctact  
3241 attaaagcca acacactttt agaaaagaaa aagggaagg gagttagaga tgaattgag  
3301 tctgagattg tcaagcctgt tgagccacct aaagagattc gtctggctac tctagattt  
3361 tttgctgggt gtggtggctt gctcatgga ctgaaaaagg cgggtgtatc tgaatcaag  
3421 tggcgagtg agtatgaaga gccagcttga caggctttta aacaaaacca tctgagtca  
3481 acagtttttg tgcacaactg caatgtgatt cttagggcta taatggagaa aggtggagat  
3541 cagatgattg tgtctctac tacagaggca aatgaattag cagctaaact aactgaggag  
3601 cagaagagta ctctgccact gctgtgtcaa gtggacttca tcaatggtg acctccatgt  
3661 cagggatttt ctggtatgaa caggttcaac caaagctctt ggagtaaaat tcaagtgtgaa

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3721 atgatattag cattcttgtc ctttgcgtgac tatttcctggc caaggtattt tctctcggag
3781 aacgtgagga ccttctgtgc attcaataaa gggcagacat ttccagcttac ttggccttcc
3841 cttctcgaaa tgggttacca ggtgagattt ggaatcctgg aggcccggtgc atatggagta
3901 tcccaatctc gtaaacgagc tttcattttgg gctgctgcac cagaagaagt tctccctgaa
3961 tggcctgagc cgatgcatgt ctttgggtgtt ccaaagttga aaatctcact atctcaaggt
4021 ttacattatg ctgctgtctg tagtactgca cttggtgcc ctttccgtcc aatcaccgtg
4081 agagacacaa ttgggtgatc tccatcagta gaaaacggag actctaggac aaacaagag
4141 tataaagagg ttgcagcttc gtggttccaa aaggagataa gaggaacac gattgtcttc
4201 actgatcata tctgcaaggc tatgaatgag cttaacctca ttcgatgcaa attaatccca
4261 actaggcctg gggctgattg gcatgacttg ccaaagagaa aggtttacgtt atctgatggg
4321 cgcgtagaag aaatgattcc tttttgtctc ccaaacacag ctgagcgcca caacggttgg
4381 aagggaactat atgggagatt agattggcaa ggaaacttcc cgacttccgt cagcgatctc
4441 cagcccatgg gtaaggttgg aatgtgcttt catcctgaac agcacagaa ccttacagtc
4501 cgtgaatgag cccgatctca ggggtttccg gatagctacg agtttgcagg gaacataaat
4561 cacaagcaca ggcagattgg gaatgcagtc cctccaccat tggcatttgc tctaggctcg
4621 aagctcaag aagccctaca tctcaagaag tctcctcaac accaacccta gataaccacc
4681 caaatgtgc atttctttt tcaataatat tagtcattat
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It should be apparent from the above comparison that the full-length *Arabidopsis* Met1 sequence is 4.7 kb in length, whereas Applicant's clone is 4.6 kb in length. Thus, Applicant did in fact disclose a partial *Arabidopsis* Met1 sequence. One of ordinary skill would have recognized that Applicant cloned and used a partial *Arabidopsis* Met1 sequence based on the knowledge of the full-length *Arabidopsis* Met1 sequence and the disclosure in Applicant's specification of the primer sequences. Applicant also notes the statement in Applicant's specification at page 31, lines 1-2 which reads: "The resulting MET1 PCR fragment is then cloned as a SmaI, XhoI fragment between the SmaI and SalI sites of pAGL5-bin forming pAGL5-asMET1 (figure 6)." (Emphasis added).

## 2) Description of a Full-Length *Arabidopsis* Met1 Sequence

Applicant gratefully acknowledges Examiner's confirmation that the written description requirement has been met for a full length *Arabidopsis* Met1 sequence. Answer at page 15, first full paragraph. Applicant wishes to make it clear, however, that Applicant's specification does not contain a working example of a full length *Arabidopsis* Met1 sequence and that the prior art does not disclose the use of a full length *Arabidopsis* Met1 sequence. The Ronemus patent discloses the use of a 4.3 kb partial *Arabidopsis* Met1 sequence. See U.S. Patent No. 6,011,200 at Figure 1 and column 11, line 54 (cited in the IDS of November 7, 2005). The 4.3 kb partial *Arabidopsis* Met1 sequence in the Ronemus patent is also disclosed in Figure 1 of the Ronemus

Science article. Ronemus et al. Science 273; 654-657 (1996), cited in the IDS of May 1, 2003. The Finnegan article discloses the use of a 2.8 kb partial *Arabidopsis* Met1 sequence. See, page 8449, right-hand column of Finnegan et al. Proc. Natl. Acad. Sci USA 93:8449-8454 (1996), cited in the IDS of May 1, 2003.

### 3) Regions of High Homology

The Examiner has now asserted that Applicant's specification does not indicate which regions are specific to the methyltransferase of the instant invention and does not describe "essential regions of the MET1 sequence that can be used for downregulation." Answer at paragraph bridging pages 17-18. Applicant pointed out in the Appeal Brief that there is high homology between the *Arabidopsis* Met1 sequence and other known DNA methyltransferases, and high homology between the *Z. mays* ortholog and other known DNA methyltransferases. Applicant pointed out particular regions with homology with up to 91%. See, e.g., Appeal Brief at paragraph bridging pages 19-20 and paragraph bridging pages 21-22. The claims encompass the use of partial fragments of the *Arabidopsis* Met1 sequence (or the *Z. mays* ortholog) but do not encompass variation in the sequence of the fragment. In view of the narrow scope of the claims, one of ordinary skill would have easily visualized the identity of essential regions that can be used for downregulation, because they include regions of high homology between the *Arabidopsis* Met1 sequence (or the *Z. mays* ortholog) of the claims and other DNA methyltransferases.

For these reasons, and the reasons stated in the Appeal Brief, the Board is requested to reverse the rejections for lack of written description.

### **Rejections Under 35 U.S.C. § 112, 1st paragraph, For Lack Of Enablement**

#### 1) Working Example of a Partial Arabidopsis Met1 Sequence

The Examiner has argued that there is no working example of a partial sequence in Applicant's specification. See, for example, Answer at page 26, page 28 and page 30. As discussed above, Examples 3 and 4 are an actual reduction to practice of a 4.6 kb partial *Arabidopsis* Met1 sequence.

2) References Supporting Jacobsen Declaration

The Jacobsen Declaration referred to four references that support enablement. Jacobsen at paragraphs 21-23 in Exhibit C of the Appeal Brief. The Examiner argues that three of the references use full-length sequences for downregulation and that one reference used a genomic DNA and, therefore, do not support enablement for the use of partial sequences. Answer at page 26. Regardless of whether the Examiner is correct, the opinion of Dr. Jacobsen regarding partial sequences is supported by other references. At least one other reference before the Examiner used a partial sequence for downregulation in a heterologous species. See page 1008, right-hand column, of Carron et al. Theor. Applied Genet. 87:1006-1015 (1994) in Exhibit N of the Appeal Brief.

3) Emery et al. Reference

The Examiner, a co-author of the Emery reference, cites this reference to support a conclusion of lack of enablement, asserting that "Emery et al. state a 100% sequence match is required between the introduced sequence and its target." Answer at page 27. Emery et al. do not state that a 100% sequence match is required. Emery et al. instead merely report that mismatches introduced within microRNA target sites of a class III HD-ZIP gene can abolish miRNA function. See, page 1769, right-hand column of Emery et al. Curr. Biol. 13:1768-1774 (2003) in Exhibit K of the Appeal Brief. As stated in the Jacobsen Declaration, the results reported in Emery do not mean that sequences with imperfect homology would necessarily be ineffective for downregulation. Jacobsen Declaration at paragraphs 24-25. The Examiner appears to have given more weight to personal knowledge about a specific biological system than to the points raised in the Jacobsen Declaration.

4) Other References Cited to Support Enablement

The Examiner argues that other references submitted by Applicant to support enablement all use full-length sequences for downregulation rather than partial sequences. Answer at page 27, bottom paragraph. The Examiner is incorrect in asserting that all of these references used

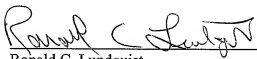
full-length sequences for downregulation, because at least one of the references used a partial sequence. See page 1008, right-hand column, of Carron et al. Theor. Applied Genet. 87:1006-1015 (1994) in Exhibit N of Appeal Brief.

For these reasons, and the reasons stated in the Appeal Brief, the Board is requested to reverse the rejections for lack of enablement.

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Respectfully submitted,

Date: Nov 7, 2007

  
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